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ABSTRACT

This study compares three six-week programs for weight control that were followed by several booster sessions and a 15-week followup. Although subjects in all programs showed significant weight losses (an average of 8.1 pounds for the 22 weeks), no significant differences between groups emphasizing stimulus control, reinforcement or general discussion were found. The overall results suggest that a program of group meetings with self-monitoring, nutritional information, and encouragement can lead to short-term weight loss, with neither information on reinforcement nor information on stimulus control contributing significantly to the loss. However, the great number of studies showing poor long-term results of weight control programs suggest that results of any weight control program lasting for less than a year should be viewed as tentative. (Author)

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A Comparison of Stimulus Control and Reinforcement Techniques for Weight Reduction

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A Comparison of Stimulus Control and Reinforcement Techniques for Weight Reduction

In the last ten years a number of studies have demonstrated the effectiveness of behavior modification techniques in the control of obesity (e.g. Harris, 1969; Harris and Hallbauer, 1973; Mahoney and Mahoney, 1976, Stuart, 1967; Stuart and Davis, 1972; Stunkard, 1972,1975). For the most part, it appears that treatment approaches utilizing a variety of self control techniques have been more effective than those which focus heavily on therapist administered rewards or aversive conditioning. The components of these more effective programs usually include instruction in such self control techniques as self monitoring, self reinforcement, and deliberate control of the stimuli in one's environment.

Previous research has not been definitive but suggests that self monitoring may be an important part of the treatment package (e.g. Mahoney, 1974, Romanczyk, 1974). The present study was designed to isolate the self reinforcement and stimulus control components of an individualized behavior modification approach to weight control, in order to see whether one of these approaches would prove superior to the other. Both approaches retained the individualized component that the senior author feels is very important to weight reduction; thus although the principles taught were the same for all subjects within a treatment group, the applications of these principles were different depending on the particular environment and needs of each subject.

Method

Subjects. Subjects were solicited by an article in the local newspaper and by an advertisement in the campus paper. All who met the criteria of (1) needing to lose at least 15 pounds according to the Metropolitan Life Insurance Company Ideal Height and Weight Charts, (2) being between the ages

of 18 and 55, (3) not being pregnant, diabetic, ill or suffering from known hormonal problems, and (4) agreeing to eat a nutritionally well balanced diet, maintain a weight loss no greater than 2 pounds a week and join no other weight control program for the duration of this program were accepted as subjects. These qualities were determined at the first group meetings. Although a number of those who attended those meetings did not come back, the mean weight of those who did and did not return after the first meeting was almost identical. The junior author, a registered nurse, conducted the screening, actually administered the program, and was careful to see that the subjects remained in good health. Of the 37 potential subjects who participated in the programs, one refused to be weighed, one joined TOPS, and one became pregnant, leaving a total of 34 subjects.

Subjects were randomly assigned to three experimental groups, Reinforcement (R), Stimulus Control (SC), or Discussion-Control (DC), subject to the constraint that persons who knew each other were assigned to the same group, to minimize exchange of information. Ten subjects were assigned to the reinforcement group, 11 to the stimulus control group, and 13 to the discussion-control group.

Procedure. All groups met weekly at the same hours on different evenings for six weeks with a two week break necessitated by the university schedule between the fourth and fifth lessons. Review meetings were held for all groups on the fourth and seventh weeks following the end of the instructional part of the program, and a final weigh-in of all subjects was conducted 15 weeks after the end of the regular instruction period.

At the first meeting of all three groups subjects were requested to maintain and monitor their usual eating patterns for a period of one week. They

were also requested to continue this self monitoring for the duration of the entire program, during which they attempted to change their eating patterns. All subjects were weighed weekly and given basic information about nutrition, exercise, calorie counting and the use of a food exchange diet. All subjects were encouraged to increase their weekly activity level and to eat a nutritionally balanced, relatively low calorie diet, but no specific exercise regime or diet was recommended for everyone. Instead it was stressed that each individual needs to find a way of eating and a life style that is appropriate for him or her to maintain an acceptable weight and that the focus of the program was on identifying and approaching that goal.

Reinforcement Group. Subjects in this group were given the Cautela and Kastenbaum Reinforcement Survey Schedule (1967) to assist them in finding suitable reinforcers. They were taught basic principles of the use of positive reinforcers and assisted in identifying behavioral goals for changing eating and exercising patterns. The goals and reinforcement during the first few weeks were implemented at least daily, with more ambitious goals and reinforcers for longer periods of time gradually introduced. Each week each subject, with the advice of the experimenter, adopted an individualized contract stating his goals and reinforcers for that week. Although the subject selected the goals and reinforcers and administered the reinforcers, the experimenter's advice was often useful, particularly in identifying attainable goals and convenient reinforcers. An attempt was made to begin with changes that were easily made and to progress gradually to more difficult ones, so that success at implementing the program would also be reinforcing. No specific instruction was given to this group about ways of controlling environmental stimuli to affect eating behavior.

Stimulus Control Group. Subjects in this group were taught basic stimulus control procedures similar to those used by Harris (1969), Stuart, (1967) and Mahoney and Mahoney (1976). These procedures included elaborations of such themes as limiting places in which eating occurs, limiting times for eating, avoiding other environmental cues for eating, suggestions for food preparation and cleanup, and slowing down actual eating behavior. As with the reinforcement group, subjects were asked to commit themselves to one change each week, with the experimenter advising them on goal selection and ways of achieving it. No specific suggestions about use of reinforcement for proper eating behaviors were given.

Discussion-Control Group. Subjects in this group received no specific information besides that on self monitoring and nutrition given to all groups. At each meeting, discussion focussed on the feelings the group had about food, their successes and failures at weight reduction and reasons why they felt they overate. The experimenter took a supportive but nondirective role, letting the participants determine the direction of the discussion. Although encouraging, the experimenter avoided making specific recommendations about behavioral changes to the subjects.

Results and Discussion

One way analyses of variance on the dependent measure of pounds lost revealed no significant differences between the groups at the end of the program $F(2,31) < 1$, at the eight week follow-up, $F(2,31) < 1$, or at the fifteen week follow-up, $F(2,31) < 1$.

Table 1 gives the weights of the individual participants in the program. As can be seen, 29 of the participants weighed less at the fifteen week follow-up than they had at the beginning of the program, with three gaining weight and two showing no change. Individual two-tailed t-tests showed that each group did show a significant weight loss from the beginning

to the 15 week [illegible] follow-up, $t(10)=7.7$, $t(13)=9.96$, $t(11)=7.2$, all $ps < .01$. However, no difference in patterns of weight loss for subjects in the three treatment groups is apparent. One reason for this lack of difference may have been the nutritional information, encouragement and support provided to all participants. Another contributory factor may be the information on behavior modification widely available through the mass media; for instance two popular women's magazines published articles on behavioral weight control during the period of this study.

Table 2 presents a summary of the participants' responses to the questionnaire administered at the end of the study. Few differences of any magnitude between the groups are apparent. Data from individual subjects suggested that a greater weight loss was associated with encouragement from home, being satisfied with the program, wishing to continue the program, counting calories, and feeling that significant changes in eating patterns had been made, although these results were not statistically significant. Of course, the short term nature of the program (5 months from start to follow-up) makes such suggestions only tentative, at best.

The results overall suggest that a program of group meetings with self-monitoring, nutritional information, and encouragement can lead to short term weight loss, with neither information on reinforcement nor information on stimulus control contributing significantly to the loss. However, the great number of studies showing poor long term results of weight control programs (Hall, 1972, Harris and Bruner, 1971; L[illegible] Mahoney and Mahoney, 1976) suggest that results of any weight control program lasting for less than a year should be viewed as tentative.

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TABLE 1

Weights of Individual Participants

Person Number	Sex	Beginning Weight	Weight at End of Program	Weight at 15 Week Follow-up	Weight Loss or Gain
Stimulus Control Group					
1	F	157	152.5	146	- 11
2	F	139	129	128	- 11
3	F	173	173	170	- 8
4	F	141	137.5	137	- 4
5	F	127	126	129	+ 2
6	F	153	147	142.5	- 10.5
7	F	170	168	164	- 6
8	F	140	138	140	0
9	F	180	170	161	- 19
10	F	161	155	152	- 9
11	F	143.5	145	145	- 3.5
Mean		154.1	149.2	146.3	- 7.2
Reinforcement Group					
1	F	172	163	153	- 19
2	M	200	192	187	- 19
3	M	188.5	185	197.5	+ 9
4	F	146	137	142	- 4
5	F	203	194	196	- 7
6	M	200	185	185	- 15
7	F	180	165	158	- 22
8	F	145	133	145	0
9	F	156	145	152.5	- 3.5
10	F	180.5	178	178	- 2.5
Mean		177.1	167.7	169.4	- 7.7
Discussion-Control Group					
1	F	160	152	151	- 9
2	F	146	133	133	- 13
3	F	158	152	150	- 8
4	F	153	160	160	+ 7
5	F	150	141	146	- 4
6	F	163	160	155	- 8
7	M	232	211	203	- 29
8	F	155	145	142	- 13
9	F	127.5	121	120	- 7.5
10	F	150	145	138	- 12
11	F	159	157	142	- 17
12	F	146	145	142	- 4
13	F	151	150	141	- 10
Mean		157.1	151.2	147.2	-10.0

TABLE 2

Questionnaire Responses

	Reinforcement	Discussion-Control	Stimulus Control
Mean beginning weight	177.1	157.1	154.1
Mean weight loss	7.7	10.0	7.2
Mean age	41.8	34.9	37.8
Worked with significant other	36%	45%	70%
Attended alone, worked alone	45%	45%	30%
Received encouragement from home	63%	46%	30%
Received no encouragement from home	9%	9%	10%
Was satisfied with progress	36%	46%	50%
Was not satisfied with progress	36%	23%	40%
Wished to continue program	54%	70%	60%
Did not wish to continue program	18%	0	30%
Changes in eating			
Identified patterns	27%	23%	10%
Watched kind of food	27%	54%	40%
Watched amount of food	9%	7%	30%
Stopped snacking	9%	14%	10%
Type of count kept of intake			
Calorie counting	54%	40%	50%
Food exchange	9%	27%	20%
Seat-of-pants	18%	23%	10%
Most useful part of program *			
Recognized eating patterns	27%	0	10%
Counting calories	18%	18%	0
Encouragement from class	36%	30%	20%

Percentages do not total to 100%; some participants did not fill out all items some answered with more than one answer; some gave ambiguous answers.

* No participant named the self control or reinforcement procedures as the most useful part of the program.